



North Pacific Climate Regimes and Ecosystem Productivity



NOAA Climate and Ecosystems Program

ISSUE

Alaskan fisheries account for approximately 50% of the US commercial fishery landings with a landed value of approximately \$1 billion each year. Global climate models predict climate change and variability will be most severe at high latitudes and there are many indications that environmental conditions are already changing in these regions. The need for resource management to account for this forcing mechanism is clear as changes in physical forcing in the region may drastically change the structure and functioning of the marine ecosystem and cause profound geographic shifts in species distributions. Predicting the probable consequences of global climate variability and change on Alaskan marine ecosystems and their valuable fishery resources and delivering the knowledge and predictive tools to fisheries managers, thus enabling the incorporation of climate impacts into the management of living marine resources in this region, is essential.



APPROACH

A sound ecosystem approach to management requires understanding how climate fluctuations affect the ecosystem. The North Pacific Climate Regimes and Ecosystem Productivity (NPCREP) study is building this understanding for the eastern Bering Sea and Gulf of Alaska by investigating the physical and biological controls on the ecosystems and how these are affected by climate variability and change. A combination of retrospective, monitoring, process and modeling studies are advancing the understanding of the impacts of climate on the fisheries in the region. NPCREP is establishing a monitoring network that utilizes existing ecosystem and climate observations and supplements these with measurements critical to the success of the project. When these observations are coupled with information from NPCREP retrospective and process studies, they will generate the necessary foundation for understanding climate-ecosystem relationships. This will enable the development and testing of indicators of climate impacts on the ecosystems and models to predict the probable consequences of climate change on the region. Researchers at the Alaska Fisheries Science Center and the Pacific Marine Environmental Laboratory, along with academic partners, are conducting the NPCREP study.

ACCOMPLISHMENTS

Funding for NPCREP was initiated in FY 2004. With this initial funding NPCREP:

- Conducted retrospective climate and ecosystem studies that added four new indices to the Ecosystems Consideration chapter of North Pacific Fishery Management Council's Stock Assessment and Fisheries Evaluation (SAFE) plan. This chapter advises the North Pacific Fishery Management Council of the status and trends of North Pacific climate and ecosystems.
- Began formation of its climate and ecosystem observation network by establishing a new monitoring site south of St. Matthew Island in the eastern Bering Sea. A mooring was deployed that measures standard oceanographic and biological parameters throughout the year, including observations during winter when the site is covered by sea ice. This new site fills an important gap in a line of moorings along the 70-meter isobath between the Alaska Peninsula and Bering Strait.
- Conducted a cruise during July 2004 to understand how marine production that is tied to climate-forced interaction of ocean circulation with local bathymetry, can be exported to juvenile fish nursery areas in the western Gulf of Alaska.
- Hosted a two-day, multi-national workshop to refine scientific questions and objectives. Thirty-seven scientists from NOAA, academia, and two international science organizations contributed to discussions designed to foster continuing development of NPCREP's Science and Implementation Plan.



MANAGEMENT AND POLICY IMPLICATIONS

Through the increased understanding being obtained about the impacts of climate variability and change on the fisheries in the eastern Bering Sea and Gulf of Alaska, NPCREP is developing indicators of climate impacts on marine ecosystems and models to predict the probable consequences of global climate change on the eastern Bering Sea and Gulf of Alaska. These products will be delivered to fisheries managers at the North Pacific Fishery Management Council so that climate variability and change can be incorporated into the management decisions affecting the living marine resources in these regions.

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